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ABSTRACT

The focus of this paper is environmental issues facing Eastern Europe and the Soviet Union as they struggle with the momentous tasks of economic and political reform. Given the important role that environmental protest played in the upheavals, environmentalists have claimed a mandate for strong environmental controls. The state of the environment and its effects on the health of the inhabitants, plants, and animals are discussed. Chapters include: (1) "Industrial Wastelands"; (2) "The Health Toll"; (3) "Declining Biological Productivity"; (4) "The Green Movement"; (5) "The Official Response"; and (6) "A Policy Agenda." (KR)

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**Green Revolutions:
Environmental Reconstruction
in Eastern Europe and
the Soviet Union**

Hilary F. French

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Worldwatch Paper 99
November 1990

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Introduction

In 1978, a Soviet writer using the pseudonym Boris Komarov wrote a slender volume titled *The Destruction of Nature in the Soviet Union*. The author was a government official who had broad access to classified data. The book, published only in the country's *samizdat* (underground press), was filled with grim stories of health-threatening pollution and human-induced environmental devastation. Publishing such a report could easily have landed Mr. Komarov in jail.¹

In late 1989, in a sign of how much things had changed, the Soviet government itself released its first national environmental report. Though its public distribution was a novelty, its contents would ring familiar to Boris Komarov, now living in Israel and able to reveal his true name, Ze'ev Wolfson. Page after page of statistics confirm Wolfson's earlier account of widespread environmental decline. The report frankly details alarming levels of air and water pollution, problems of environmental health, and the degradation of soils and forests.²

A similar pattern emerges in Eastern Europe. The revolutions that toppled regimes throughout the region in 1989 are giving rise to an unprecedented mass disclosure of previously restricted environmental information. These revelations have brought to light numerous instances of ecological devastation. For example, people living in the polluted northern Bohemia region of Czechoslovakia, where residents die younger than elsewhere in the country, are offered financial compensation termed "burial money" by its recipients. Sixty-five percent of Poland's river water is deemed unfit for industrial use, let alone drinking. School children living in polluted areas are regularly taken on special vacations to breathe clean air. Such disclosures led to outpourings of public concern and promises by the region's new governments to

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address their environmental plight. The changed political climate is reason for optimism, but the magnitude of the problems remains daunting.³

- 6 Though bound together by the post-World War II legacy of Communist rule and in some cases by a common Slavic heritage, Eastern Europe and the Soviet Union are distinct culturally, historically, and geographically. (See Maps 1 and 2.) Many East Europeans underscore this point by referring to their region as Central Europe. But their shared experience with central planning and authoritarian regimes has left the Soviets and their former allies with some common environmental traits. Both Eastern Europe and the Soviet Union also are now undergoing a period of momentous political change, which offers both pitfalls to and opportunities for environmental restoration.⁴

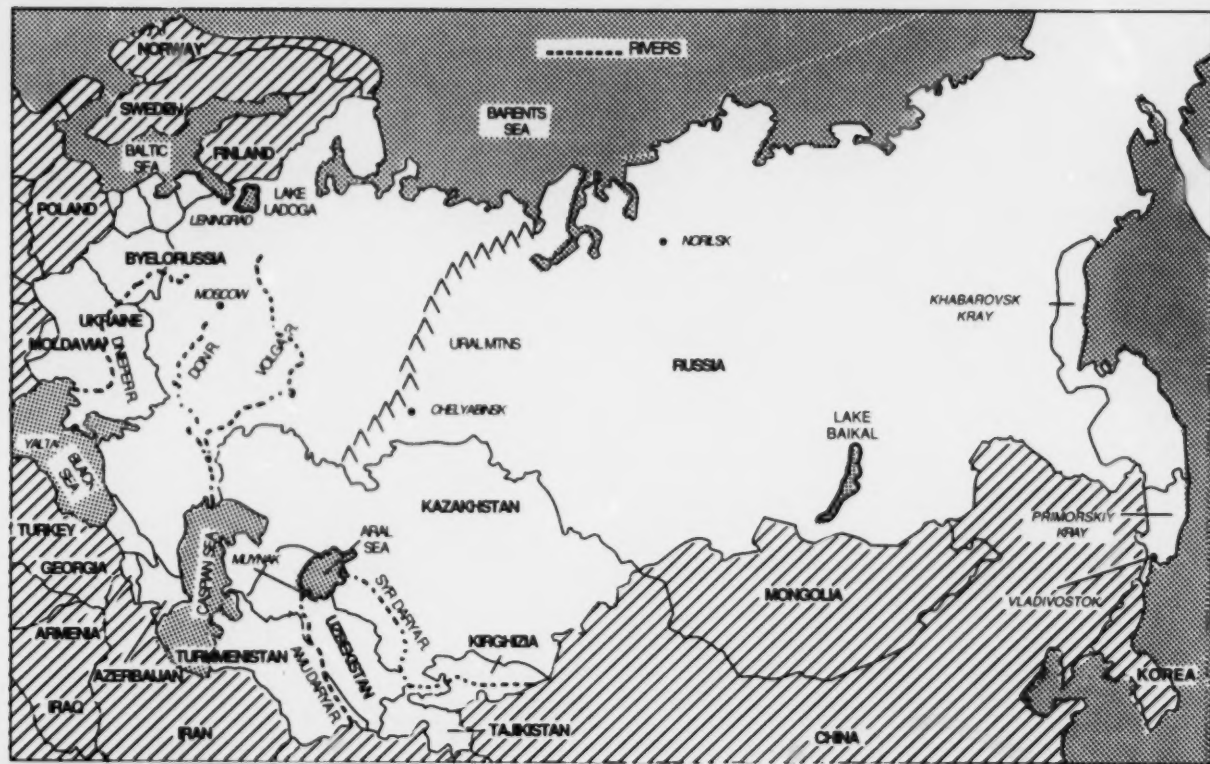
One of the distinguishing features of the East European revolutions of 1989 is their strong environmental component. In numerous instances, the environment in the pre-revolution days served as a rallying point from which broader demands for political change emerged. Initially perceived as relatively benign by the region's Communist governments, environmental movements soon acquired unstoppable momentum.⁵

In Hungary, mass protest against the Nagymaros Dam was instrumental in the development of an effective political opposition, which eventually undermined the Communist Party's exclusive hold on power. The police force's brutal suppression of protests in Sofia, Bulgaria, led by the environmental group 'Ecoglasnost', contributed to the fall of old-guard Prime Minister Todor Zhivkov. The clandestine publication by the Slovak Union of Nature and Landscape Protectors in Bratislava, Czechoslovakia, of a report bluntly detailing the region's environmental crisis helped turn the people against the Communist regime there. Severe pollution and the resulting decay helped fuel mass pro-democracy demonstrations in Leipzig in eastern Germany.⁶

In the Soviet Union as well, public disgust with widespread environmental devastation is playing an instrumental role in the country's political evolution. The first demands for independence in the Baltic republics emerged from environmental protests. The connection in the minds of the demonstrators was direct: The environmental problems



Map 1: Eastern Europe



Map 2: The Soviet Union

"Investing in pollution control in East European countries is a cost-effective way for West European nations to clean up at home."

created by a phosphorus mine in Estonia, for example, could only be solved by replacing those that put the plant there to begin with—Soviet planners in Moscow.⁷

Environment and politics are becoming an equally explosive mix in other Soviet republics. One of Boris Yeltsin's early moves as president of the Russian Republic was to challenge the central government's authority by announcing a moratorium on the construction of new nuclear power plants. Environmental activism in the Ukraine helped fuel the nationalism leading to the republic's July 15 declaration of national sovereignty. Environmentalists across the Soviet Union's 15 republics are looking expectantly at the new environment agencies and legislatures (supreme soviets) at the federal and republic levels to establish an effective system of environmental regulation and law.⁸

Public opinion polls, a new phenomenon in the former Eastern Bloc, reveal the depth of the public's concern. A poll conducted in the Soviet Union at the end of 1988 found that 47 percent of those surveyed considered environmental pollution to be the nation's most urgent problem, ahead of housing shortages, poor medical service, and red tape. A

poll taken in Czechoslovakia in early 1990 found that 83 percent of respondents considered improving environmental conditions to be the country's top priority.⁹

The fate of the East European and Soviet environments is of concern not only to residents of this region, but to the entire world. The Soviet Union alone covers one-sixth of the earth's land mass and pumps out 19 percent of world emissions of carbon dioxide (CO₂), the gas chiefly responsible for global warming, 13 percent of the chlorofluorocarbons (CFCs), substances which deplete the ozone layer, and roughly a fifth of the sulfur dioxide (SO₂), a principal ingredient of acid rain. Eastern Europe accounts for 7 percent of global CO₂ emissions and 4 percent of CFCs. Because of its location, a significant share of Eastern air and water pollution winds up in Western Europe. Indeed, investing in pollution control in East European countries is a cost-effective way for West European nations to help clean up at home.¹⁰

Focusing on environmental issues will not be easy for Eastern Europe and the Soviet Union as they struggle with the momentous tasks of eco-

conomic and political reform. The voices calling for the environment to be shortchanged for budgetary and other reasons threaten to drown out those pushing for its restoration. And the short-term costs of environmental cleanup, such as investments in pollution control and jobs lost due to plant shutdowns, may be more readily apparent than the economic and quality-of-life benefits.

Throughout the region, however, cleaning up the environment is by no means a luxury. Under the assault of air pollution and acid deposition, medieval cities are blackened and crumbling, whole hillsides are deforested, and crop yields are diminishing. Rivers serve as open sewers, and clean drinking water is in scarce supply. Perhaps most alarming of all, people are dying from pollution. In the dirtiest parts of the region, life expectancies are years lower and rates of cancer, reproductive problems, and a host of other ailments far higher than in cleaner areas.

Though precise figures are hard to come by, economists estimate that environmental degradation is costing Poland 10 to 20 percent of its gross national product (GNP) every year and Czechoslovakia 5 to 7 percent. The health costs of pollution in the Soviet Union were reported to be 190 billion rubles (\$330 billion at the official exchange rate in October 1990) in 1987, or 11 percent of estimated GNP. Investments in environmental protection are thus virtually guaranteed to provide economic benefits.¹¹

Given the important role that environmental protest played in the recent upheavals in Eastern Europe and the Soviet Union, environmentalists can fairly claim a mandate for strong environmental controls. Respecting the call will require a sustained commitment from both national governments and the international community. Without it, the damage will only mount.

Industrial Wastelands

Until recently, billowing smokestacks were regarded as a symbol of national prowess in Eastern Europe and the Soviet Union. But the intense emphasis on rapid industrialization, widely celebrated in Communist propaganda posters, has exacted a heavy toll. Air and water pollution levels are reminiscent of the fifties and sixties in the

"The Soviet Union and East European countries use 50 to 100 percent more energy than the United States to produce a dollar of GNP."

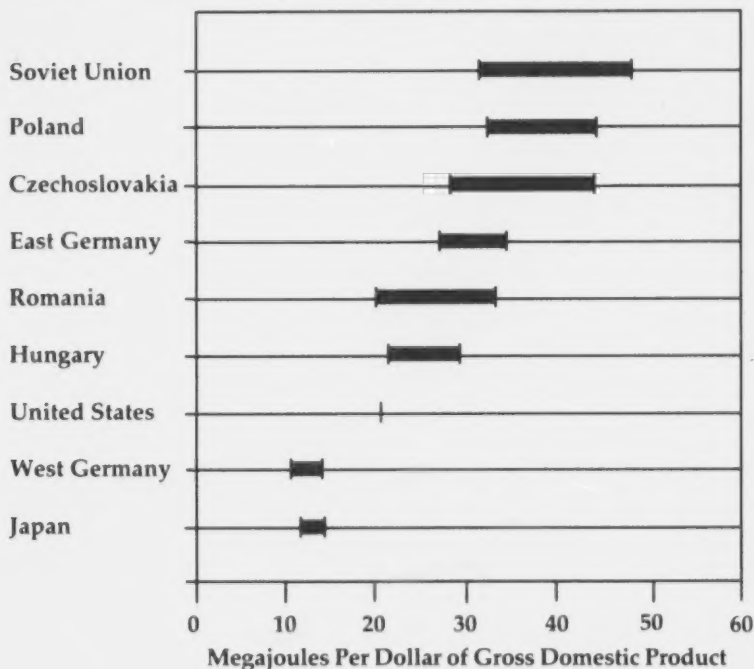
West, before the advent of the environmental movement. Pollutants not spewed into the air or water have been dumped on land—hazardous waste disposal has been largely unregulated.

Air pollution is staggering in the region. In the Soviet Union, the air in 103 cities, home to more than 50 million people, exceeds the Soviet health-based standard (which is generally stricter than U.S. standards) by 10 times. In 1988, 16 towns periodically experienced pollution levels more than 50 times the standard. Similarly dire conditions prevail in much of Eastern Europe. In industrial regions of what was formerly East Germany, for example, average annual sulfur dioxide levels are five times the U.S. standard, and average annual particulate levels 13 times the U.S. standard. In Hungary, nearly half of the population lives in areas with heavily polluted air.¹²

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In Eastern Europe, the primary cause of air pollution is the burning of indigenous supplies of lignite, also known as brown or soft coal. Lignite is low in energy content, and the variety burned in Eastern Europe is high in sulfur. East Germany, before reunification, relied on brown coal for 72 percent of its primary energy consumption, and Czechoslovakia relies on it for 41 percent. Together, they burned nearly one-third of the world's lignite. Coal supplies 80 percent of Poland's energy, although it is mainly less-polluting hard coal. Many coal-burning plants in the region have no pollution control technology whatsoever, and those that do, employ controls significantly less effective in removing pollutants than Western varieties.¹³

Extremely inefficient use of energy also contributes to degraded air quality. Because of government subsidies that kept energy costs extremely low and the absence of a meaningful pricing structure, industries and individuals have had little incentive to conserve. Thus, the region missed out on the large efficiency gains made in the West in response to the oil price increases of 1973 and 1979. Open hearth steel manufacturing and other outdated, inefficient technologies are still widely used by East European and Soviet industries. The Soviet Union and East European countries generally use 50 to 100 percent more energy than the United States to produce a dollar of gross domestic product (GDP) and 100 to 300 percent more than Japan. (See Figure 1.)¹⁴

Figure 1: Estimated Energy Intensity, Selected Countries, 1985¹

¹1985 is most recent year for which reliable data are available for all countries. Reliable data are unavailable for Bulgaria. Range in data reflects differing estimates of economic output, corrected for purchasing power and currency fluctuations. GDP is measured in 1980 dollars of purchasing power parity. Numbers for East European countries and the Soviet Union are GNP, as no data exist for GDP, and GDP and GNP are essentially equivalent in these countries.

Source: Data supplied by William U. Chandler and Stan Kolar, Battelle Pacific Northwest Laboratories. GDP deflator used to extrapolate Japanese data from International Monetary Fund, *International Financial Statistics Yearbook 1990* (Washington, D.C.: 1990).

The combination of coal dependence, few pollution controls, and energy inefficiency has resulted in levels of sulfur dioxide in Eastern Europe that are among the highest in the world. Ranked by both emissions per dollar of GNP and emissions per capita, East European countries are the most heavily polluting. (See Table 1.) A single lignite-burning power plant in the former East German town of Boxberg emits 460,000 tons of sulfur dioxide annually, more than total emissions in Denmark and Norway combined.¹⁵

In the city of Most in the highly-polluted northern Bohemia region of Czechoslovakia, sulfur dioxide concentrations average 132 micrograms per cubic meter annually and peak levels in the region soar to 1,000; the World Health Organization (WHO) standard (which Czechoslovakia has adopted) is an average of 40 to 60 micrograms per cubic meter. In Prague, the average annual concentration is 155, and the WHO standard is exceeded 128 days each year.¹⁶

Emissions of nitrogen oxides (NOx), which contribute to both acid deposition and ground-level ozone (formed when NOx react in sunlight with hydrocarbons, and harmful to humans, crops, and trees), are also high. Per unit of GNP, Czechoslovakia has the highest level of NOx production, with Poland close behind. (See Table 2.) NOx emissions—caused by automobile exhaust, factories, and power plants—are high in spite of far lower car ownership rates than in the West: In 1988, the Soviet Union averaged 18 people per car, Eastern Europe 6.6, and the United States less than 1.8.¹⁷

Though the absolute number of automobiles is relatively low, pollution production per automobile is high. The East German automobiles, the Trabant and the Wartburg, are particularly dirty because of their two-stroke engines. These engines, which burn a combination of gasoline and oil, emit far more hydrocarbons, particulates, and aldehydes (a class of organic chemicals), though less NOx, than conventional four-stroke cars. Indeed, the smoking Trabants (found throughout Eastern Europe and the USSR) became a potent symbol of the East European environmental crisis when they started pouring across the border after the Berlin Wall came down. Other cars produced in the region have four-stroke engines, but are nonetheless more polluting than West European cars.¹⁸

Table 1: Sulfur Dioxide Emissions, Selected Countries, 1988¹

Country	Emissions	Emissions Per Capita	Emissions Per Dollar GNP
	(thousand tons)	(kilograms)	(grams)
East Germany	5,258	317	31
Czechoslovakia	2,800	179	24
Bulgaria	1,030	114	21
Poland	4,180	110	20
Romania ²	1,800	78	19
Hungary	1,218	115	17
Soviet Union ³	10,124	35	5
United Kingdom	3,664	64	5
United States ⁴	20,700	84	4
Sweden	214	25	1
France	1,226	22	1
West Germany	1,300	21	1

¹Preliminary data.²Emissions data from 1980.³European part of the Soviet Union.⁴Emissions data are for sulfur oxides.

Sources: Worldwatch Institute, based on U.N. Economic Commission for Europe, *The State of Transboundary Air Pollution: 1989 Update* (Geneva:1990); U.S. Environmental Protection Agency, *National Air Quality and Emissions Trends Report, 1988* (Research Triangle Park, N.C.: 1990); Population Reference Bureau, "World Population Data Sheet," Washington, D.C., 1988. GNP extrapolated from 1980 adjusted purchasing power parity levels in Paul Marer, *Dollar GNP's of the USSR and Eastern Europe* (Baltimore: Johns Hopkins University Press, 1985), using growth rates from Directorate of Intelligence, U.S. Central Intelligence Agency, *Handbook of Economic Statistics, 1989* (Washington, D.C.: 1989).

In Hungary, motor vehicles are responsible for nearly half of the country's carbon monoxide and nitrogen oxides, about one-third of the hydrocarbons, and most of the lead emissions. In downtown Budapest, recent measurements found lead levels nearly 30 times the standard. In

Table 2: Nitrogen Oxides Emissions, Selected Countries, 1988¹

Country	Emissions	Emissions Per Capita	Emissions Per Dollar GNP
	(thousand tons)	(kilograms)	(grams)
Czechoslovakia	950	61	8
Poland	1,550	41	7
East Germany	708	43	4
Hungary	259	24	4
United States	19,800	80	4
Romania ²	390	17	4
Bulgaria	150	17	3
United Kingdom	2,480	43	3
West Germany	2,860	47	3
Sweden	390	46	2
France	1,615	29	2
Soviet Union ³	4,190	15	2

¹Preliminary data.²1985 estimate.³European part of the Soviet Union.

Sources: Worldwatch Institute, based on U.N. Economic Commission for Europe, *The State of Transboundary Air Pollution: 1989 Update* (Geneva: 1990); Christer Agren, "Tracking Air Pollutants," *Acid News*, January 1, 1990; U.S. Environmental Protection Agency, *National Air Quality and Emissions Trends Report, 1988* (Research Triangle Park, N.C.: 1990); Population Reference Bureau, "World Population Data Sheet," Washington, D.C., 1988. GNP extrapolated from 1980 adjusted purchasing power parity levels in Paul Marer, *Dollar GNP's of the USSR and Eastern Europe* (Baltimore: Johns Hopkins University Press, 1985), using growth rates from Directorate of Intelligence, U.S. Central Intelligence Agency, *Handbook of Economic Statistics, 1989* (Washington, D.C.: 1989).

half of all samples, concentrations of formaldehyde, a probable human carcinogen, exceed the standard. Ozone, during sunny, summer weather, and carbon monoxide frequently exceed acceptable levels. As Eastern Europeans and Soviets acquire more automobiles, these pollution problems are likely to grow worse.¹⁹

Industrial emissions of a variety of toxic chemicals are also a major source of air pollution. Throughout Eastern Europe and the Soviet Union, highly polluting heavy industries were established in the post-war industrialization drive. In Hungary, for example, the chemical industry's share of gross production rose from 3.5 percent in 1950 to 19.1 percent in 1986. The economic base remains largely heavy-industry oriented, in contrast to the service-driven economy that has developed in the West. In each country of the region, industry comprises more than 50 percent of the economic base and services less than a quarter. In Sweden, by contrast, industry makes up only 32 percent of the total and services 65 percent—a pattern repeated in other Western countries.²⁰

The region's heavy industries tend to be clumped in isolated geographic areas, where they pump large quantities of toxic fumes into the air. These industrial zones have some of the highest concentrations of pollution ever recorded. For example, the town of Yana in Bulgaria, located midway between the Kremikovtsi metal works and a uranium mine, has been dubbed a "doomed village" by the local press owing to high levels of toxic chemicals in the air. After medical evidence showed that only one out of every nine children in the village could be considered healthy, authorities decided to investigate the possibility of resettling all 1,550 residents.²¹

In Romania's small town of Copsa Mica, every person and object is covered in a film of black soot from a nearby plant that produces black powder, an ingredient in the manufacture of rubber. Reports Celestine Bohlen of the *New York Times*: "For about 15 miles around, every growing thing in this once-gentle valley looks as if it has been dipped in ink. Trees and bushes are black; the grass is stained. The houses and streets look like the inside of a chimney. Even the sheep on the hillsides are a dingy gray."²²

Complicating the picture is air pollution's transboundary nature. Sulfur dioxide emissions are continually traded back and forth between countries. The East European countries export from 68 to 97 percent of their SO₂ emissions, but import 40 to 91 percent of the SO₂ deposited within their borders. Toxic emissions do not respect borders either. For example, the town of Ruse, Bulgaria, has been poisoned over the years

"Many large cities still do not have any sewage treatment facilities."

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by chlorine emissions from a noxious Romanian plant just across the Danube. Protests against this factory in early 1987 constituted the first stirrings of environmentalism and anti-government sentiment in Bulgaria. The plant's continuing emissions are becoming a major irritant in Bulgarian-Romanian relations.²³

Industrial byproducts not pumped into the air tend to be dumped into bodies of water at levels almost unimaginable in the West. The Buna chemical plant in the former East German district of Halle, for instance, discharges 20 kilograms of mercury every day—10 times as much as a chemical plant in the former West German district of Ludwigshafen discharges in an entire year. A coal gasification plant in Espenhain, eastern Germany, discharges 4,000 cubic meters of wastewater daily, including 20 tons of phenol, 2 tons of ammonia, and heavy metals. Industrial discharges, combined with untreated sewage and agricultural runoff, have contaminated most rivers, lakes, and seashores in Eastern Europe and the Soviet Union.²⁴

Seventy percent of Czechoslovakian rivers are badly polluted. About a third of those in Bohemia (the Czech Republic) and half of those in Slovakia can no longer support aquatic life. A third of the rivers and 9,000 lakes in former East German territory are biologically dead. Eighty percent of Romania's river water is unpotable.²⁵

In Czechoslovakia, only 40 percent of wastewater is adequately treated. Just 48 percent of Bratislava's industrial waste and household sewage is purified before being released into the Danube. In Hungary, some 1.3 billion cubic meters of untreated sewage is discharged into the country's surface waters every year. Much of the rest is only nominally treated; more than 44 percent of Hungary's sewage treatment plants are equipped merely for rudimentary treatment. Half of Poland's cities, including Warsaw, and 35 percent of its industries, do not treat their waste at all.²⁶

In 1988, the Soviet Union could adequately treat only 30 percent of its sewage. Fifty percent was improperly purified, and the remaining 20 percent was dumped into the environment raw. Many large cities, such as Kaunas, Lithuania, and Riga, the capital of Latvia, still do not have any sewage treatment facilities. In addition to increased output of

waste, water quality is being impaired by decreased water flows as water is siphoned from major rivers for irrigation. Water flows in the Dnieper have been reduced by 19 percent and in the Don by 30 percent. Thus, more waste is being mixed with less water, increasing waste concentration markedly.²⁷

Clean drinking water is in scarce supply throughout the region. Of Hungary's 3,000 towns and cities, around 700, home to 300,000 people, now rely on bottled water or water piped in from neighboring communities because their own wells are contaminated with pesticides and nitrates from fertilizer runoff. In May 1989, arsenic was discovered in the drinking water supply of 76 settlements in southern Hungary. Half of Czechoslovakia's drinking water does not meet the national health standards. Because of nitrate contamination, pregnant women and infants in Czechoslovakia are advised not to drink tap water in many regions. Unfortunately, supplies of bottled water are inadequate. In the Soviet Union, 18 percent of water samples taken nationwide in 1988 failed to meet health standards.²⁸

Industrial pollution and agricultural runoff in the Soviet Union are threatening Lake Baikal, the largest body of fresh water in the world. The lake contains 80 percent of the country's supply of fresh water and supports 2,400 species of plants and animals, more than two-thirds of which are found nowhere else on earth. A comprehensive plan was put in place in 1987 to clean up the offending enterprises; unfortunately, progress has been slow. By January 1989, only 26 of 41 environmental projects (such as improving sewage treatment and enforcing discharge limits from paper mills) had been completed as planned. Nearly two-thirds of the projects that were scheduled to commence in 1988 never did.²⁹

Because many of the rivers of the region cross political borders, water pollution is a source of international conflict. Romania's pollution of the Tisza River's headwaters has long been a point of contention with neighboring Hungary. In 1988, the Polish government asked Czechoslovakia to pay damages for the contamination of the Polish stretch of the Odra River caused by a heavy fuel oil leak in November 1986. The Danube travels through western Germany, Austria, Czechoslovakia, Bulgaria, Romania, and the Soviet Union, picking up

"Because of nitrate contamination, pregnant women and infants in Czechoslovakia are advised not to drink tap water."

industrial and biological waste along the way. Few of the cities and towns along its East European route treat their sewage.³⁰

The polluted rivers of the region ultimately find their way to the seas. Each year the Elbe River carries 10 tons of mercury, 24 tons of cadmium, and 142 tons of lead into western Germany and then the North Sea. The Caspian Sea receives 40 percent of the USSR's 28.6 cubic kilometers of polluted wastewater annually, most of it from the Volga. The Black Sea receives 4,300 tons of nitrogen compounds, 900 tons of petroleum products, 600 tons of lead, and 200 tons of detergents from industrial wastes, much of it from the Danube and Dnieper rivers. This waste and a naturally-occurring hydrogen sulfide cloud in the water that is exacerbated by the pollution have rendered 90 percent of the Black Sea biologically dead. In 1988, over half of the floor of the central Baltic Sea was found to be devoid of life. The Baltic receives more than 46 percent of its nitrogen load and more than 53 percent of its organic waste from Poland, eastern Germany, and the Soviet Union, though they occupy only a third of its coastline.³¹

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The catastrophic state of these seas has economic repercussions. At one time, the Caspian held 90 percent of the Soviet Union's caviar-producing sturgeon fishery. But populations of sturgeon and other valuable fish have declined by more than two-thirds over the past 20 years. In the Black Sea, fish populations are dropping precipitously as the hydrogen sulfide cloud rises toward the surface. Beaches along these two seas and the Baltic have closed periodically over the last few years because of pollution. Resorts—such as Yalta on the Black Sea and Yurmala on the Baltic—are imperiled as a result.³²

Though data are scarce, hazardous wastes appear to have been indiscriminately dumped on land throughout the region. Some 15,000 hazardous dump sites are awaiting evaluation in former East German territory. Prague's city planners cannot account for 80 percent of the estimated 40,000 tons of hazardous waste produced in the city annually. Little wonder, then, that illegal dumps are being uncovered throughout Czechoslovakia. For instance, the national radio station reported that the drinking water near the towns of Jáchymov and Nejedek in north-western Bohemia has been contaminated for years with uranium from nearby mines. Near Karlovy Vary, a spa famous for its mineral water

hot springs, a dump was discovered with 3,500 tons of toxic waste containing nerve poison.³³

20 In the Soviet Union, more than half of nearly 6,000 official landfills do not meet sanitary regulations. In the republics of Uzbekistan, Georgia, Moldavia, Latvia, and Turkmenistan, over three quarters of the landfills do not comply with regulations. Of greatest concern, however, is illegal dumping. Notes Soviet analyst D.J. Peterson of the RAND/UCLA Center for Soviet Studies in Santa Monica, California: "Every week, the Soviet press carries a new story about the discovery of improperly disposed of, often hazardous wastes. The picture pieced together from these reports is, in essence, one of enterprises dumping their wastes wherever and however it is convenient for them, with little monitoring by officials and no threat of prosecution for violation of environmental codes."³⁴

One of the more notorious cases of illegal dumping occurred in Sillamae in northeast Estonia. When 300 children attending two kindergartens began to lose their hair, residents were horrified but baffled. Eventually, after months of speculation, the former director of a local factory revealed that his company had dumped radioactive wastes where the schools were later built.³⁵

Some of the most egregious cases of inadequately handled waste apparently involve the military. In both Czechoslovakia and Hungary, Soviet military forces are leaving behind environmental disasters as they withdraw. For example, at a maintenance depot in northern Moravia, Czechoslovakia, the Soviets emptied a 15,000-gallon fuel tank onto the ground and then took the empty tank home with them. The groundwater beneath the depot is now covered with 20 to 25 centimeters of diesel oil. In the Soviet Union, radioactive waste from nuclear weapons complexes poses a great problem. Bomb producers in Chelyabinsk in the early fifties pumped waste into Karachay Lake, a 41-hectare body of water that has no outlet, until the accumulation was 120 million curies, about two-and-a-half-times greater than the release from the Chernobyl nuclear accident in 1986.³⁶

The Health Toll

Of all the data from Eastern Europe and the Soviet Union released in the last year, perhaps none are as shocking as the health statistics.

**"Children in regions where pesticide use is high
have overall sickness rates five times those of
children living in clean areas."**

Shortened life expectancies, soaring cancer rates, and a host of other maladies have been recorded in highly polluted regions.

Because environmental factors are superimposed on a more general health-care crisis, sorting out precise causes and consequences is impossible. High rates of smoking and alcohol use and poor diets are thought to contribute heavily to adverse health trends. Inadequate health-care systems are also to blame. Interactions between the various factors combine to create a situation where the whole is undoubtedly worse than the sum of its parts. Though it is difficult to pinpoint the role played by environmental factors in the region's health crisis, a mounting body of evidence suggests it is a substantial one.¹⁷

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The Soviet Ministry of Public Health has studied the health of populations where industrial pollution is unusually high. According to the national environmental report, there is a clear link between air pollution levels and the incidences of a variety of ailments. The higher the overall level of pollution, the higher the rates of malignant tumors, respiratory disease, and skin disease. The Ministry also found a correlation between the types of sickness observed and the kinds of industry in the region. Fertilizer production appeared to be related to an increase in cancer rates and in blood and cardiovascular diseases. Nonferrous metal works were associated with increased rates of skin diseases and cancer rates among children. Young children in regions where pesticide use is high have overall sickness rates five times those of children living in relatively clean areas.¹⁸

In the Karakalpak Autonomous Republic, which encompasses the southern part of the Aral Sea, infant mortality is 60 deaths per 1,000 live births, the highest rate in the country and comparable to the rates of Cameroon and Guatemala. This is thought to be due to both the poor health care system in the region and to the contamination of water and food with pesticides and salts. In Aktjubinsk in northern Kazakhstan, where many chemical plants are located, various cancers occur six times more frequently than in adjacent regions. People living in the center of Alma-Ata, the capital of Kazakhstan, suffer from respiratory diseases 2.4 times more frequently than suburbanites, and nervous organ diseases 4.5 times as frequently. Rates of bronchial asthma among children living inside Sadovoe Kol'tzo, the ring road

around Moscow, are two times higher than those among children living outside it.³⁹

- 22** Recent disclosures of the scope of the Chernobyl nuclear power disaster have shocked the Soviet public. Amid charges of a coverup, the government has finally conceded that the population's exposure to radiation far exceeded initial estimates. Contrary to earlier reports—and allocations of relief money—the Republic of Byelorussia received the bulk of the fallout. As a result of the newly-released information, 200,000 evacuations are expected by 1992 from contaminated areas in the Ukraine, Byelorussia, and the Russian Republic. Byelorussian officials believe that more than 2 million people should be moved from poisoned lands.⁴⁰

Concern is rising that the health impact of the disaster may be far greater than originally supposed. Soviet authorities now admit that the thyroid glands of more than 150,000 people were "seriously affected" by radioactive iodine, that rates of thyroid cancer among people living in the affected area are five to ten times higher than would normally be expected, and that leukemia rates among children are two to four times normal levels. Though debate rages over whether these increases can be attributed to the accident, numerous reports of grossly deformed farm animals being born in the contaminated zone do not lend comfort to the many people convinced their health is endangered.⁴¹

Long-rumored stories of reduced life expectancy in the most polluted regions of Eastern Europe are beginning to be confirmed. In the dirtiest areas of Czechoslovakia, life expectancy is as much as five years less than in relatively clean parts of the country. In heavily industrialized Silesia, Poland, people die three to four years earlier than in the rest of the country. In Halle, eastern Germany, a center of the chemical industry, people can expect to live five years less than other eastern Germans. People born and raised in environmental disaster areas are only now entering middle age, and many of them may become ill in the years ahead.⁴²

Long-classified research conducted by Dr. Kiriaki Basmadjieva of the Bulgarian Health Ministry reveals that asthma and ulcer rates among people living near heavy industrial complexes in Bulgaria are nine

"In the dirtiest areas of Czechoslovakia, life expectancy is as much as five years less than in relatively clean parts of the country."

times those of people living in relatively pristine areas, rates of skin disease some seven times higher, of rickets and liver diseases four times higher, and of hypertension and nervous system diseases three times as high. Children in the industrial town of Kuklen, Bulgaria, have so much lead in their blood that they would be rushed to a hospital for detoxification if they lived in the United States, according to Dr. Ellen Silbergeld, a toxicologist with the Environmental Defense Fund.⁴¹

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Researchers at the Institute of Hygiene and Epidemiology in Prague have found a correlation in areas of Czechoslovakia between high air pollution levels and elevated rates of a number of health problems, including acute respiratory illnesses. Children in these regions exhibit retarded bone development, diminished immunity, and a higher incidence of enlarged lymph nodes and cranial infections. In areas with high lead and arsenic pollution, hair samples indicate elevated levels of these heavy metals in children's hair. Over the last decade, the number of people suffering from pollen allergies increased by six times in adults and ten times in children, with about 30 percent of all children suffering from some kind of allergy.⁴²

The state of health in Hungary, as elsewhere in the region, is clearly on the decline. Heart disease and cancer rates are increasing, leading to shorter life expectancies. Rising mortality rates coincide with a period of growing pollution, but showing a causal relationship is problematic. Yet studies in the industrial cities of Dorog, Ajka, and Pápa demonstrated that children living in highly polluted air develop twice as many diseases of the upper respiratory system as do those living in areas with clean air. Asthmatic diseases are also on the rise in polluted areas. Another report established a correlation between the incidence of congenital birth defects and environmental pollution. According to the National Institute of Public Health, 1 out of every 24 disablements and 1 out of every 17 deaths in Hungary is caused by air pollution.⁴³

In Poland, several illnesses—including tuberculosis, pneumonia, bronchitis, and leukemia—are more common in heavily polluted areas. A collaborative report prepared by the Institute for Environmental Engineering in Zabrze, Upper Silesia, and the Environment Center of Berlin indicates that residents of Upper Silesia have 155 percent more circulatory illnesses, 30 percent more cancer, and 47 percent more respi-

ratory illness than the national average. Researchers believe these trends help explain why life expectancy for Polish men aged 40 to 60 has fallen back to 1952 levels.⁴⁶

The Polish Chemical Society concluded in 1984 that rates of mental retardation in Silesia were "appalling." The report attributed this to high concentrations of heavy metals, particularly lead, in the air, water, soil, and food of the region. Indeed, lead levels in Silesian soils exceed standards by 150 to 1,900 percent. Children attending summer camp there were found to have five times as much lead in their blood as children in Denmark.⁴⁷

Declining Biological Productivity

Just as the health of humans is threatened in the Soviet Union and Eastern Europe, so is that of plants and animals. Agricultural productivity is declining in response to land degradation and pollution, forests are ravaged by both air pollution and mismanagement, and biodiversity is threatened. In essence, the natural resource base that underlies the economy is dangerously depleted.

Land degradation is a major barrier to raising agricultural productivity. In the Soviet Union, at least 1.5 billion tons of topsoil erode away annually. Roughly 150 million hectares, two-thirds of arable land, has lost fertility because of wind and water erosion. Production losses attributable to soil erosion cost the Soviet economy 18 to 20 billion rubles [\$31- to \$35 billion] annually. Twelve percent of irrigated farmland, amounting to 2.5 million hectares, is contaminated with salt or salt compounds due to poor drainage systems. Between 1975 and 1985, the area of salinized land nearly doubled.⁴⁸

The Aral Sea disaster is the most infamous example of the degradation that can result from faulty irrigation practices. Until 1973, the Aral was the fourth-largest inland body of water in the world. But water from the two rivers that feed it, the Amu Darya and the Syr Darya, has been diverted to irrigate cotton and other crops. As a result, since 1960 the Aral's volume has dropped 66 percent, its surface area has decreased 40 percent, and its level has fallen nearly 13 meters. The former port of

"Since 1960, the Aral Sea's volume has dropped 66 percent and its level has fallen nearly 13 meters."

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Muynak now lies 48 kilometers from the shoreline. Rotting fishing boat hulls lend an eerie ghost-town feel to the once-thriving port. The former seabed has become a saline desert from which vast dust storms sweep up salt and sand, then deposit the crop-killing mixture on the surrounding farmland at a rate of almost half a ton per hectare each year.⁴⁹

Several East European countries also report growing problems with land degradation. In Bulgaria, 80 percent of cultivable land is affected by erosion. In Czechoslovakia, 54 percent of agricultural land is endangered by water- and wind-induced soil erosion; about 5 million tons of soil are lost annually. In both Hungary and Romania, water and wind erosion endanger more than 30 percent of arable land. Several countries also report salinization and waterlogging problems.⁵⁰

Industrial pollution is also lowering crop yields. Many different pollutants are thought to contribute to the problem, including acid deposition, ozone, and heavy metals. By unhappy coincidence, the major pollution sources in the Soviet Union are located in agricultural areas. The worst culprits are the metallurgical centers. In 1988, lead concentrations in soils surrounding the village of Glubokoe, a nonferrous metallurgical center, were found to be 22 times the permitted level, while cobalt and zinc concentrations exceeded allowed levels by 10 and 100 times, respectively. Mercury concentrations up to 100 times the standard have been observed in Khaidarkan, Kirghizia. In a different form of contamination, 20 percent of Byelorussian farmland was rendered unusable by radiation received in the Chernobyl disaster.⁵¹

These harmful emissions threaten to negate progress toward improved agricultural practices. Says the chairman of the Soviet environment agency, Nikolai Vorontsov: "We will try to introduce new and more progressive soil protection measures—plowing across slopes, using the very gentlest hardware, limiting the amounts of chemicals going into the soil, and so on, while poison will continue to be showered from above."⁵²

Though data are scarce, air pollution-related crop losses are thought to be considerable. The yields of beans exposed to SO₂ in upper Silesia, Poland, decreased from 10 to 40 percent, yields of potatoes dropped 10

to 55 percent, and yields of barley decreased 35 percent, depending on the concentration. In Czechoslovakia, alfalfa, cereals, and lettuce yields are thought to be affected by pollution; sulfur dioxide-induced crop damage is estimated to cost the economy 3 billion koruna [\$192 million] annually.³³

Fertilizer and pesticide use in the countries of the region varies considerably. Although use per hectare is generally on a par with that in the West, the chemicals are often applied inappropriately. Prices for these agricultural inputs are heavily subsidized, leading farmers to dump more and more of them on the land whether they are raising yields commensurately or not. Application rates are often determined by a planner in a faraway city who is unlikely to know the appropriate rates—or whether a pest has developed resistance to a chemical, rendering it ineffective.

In the Soviet Union, an audit conducted by the State Planning Office (Gosplan) found that 11 percent of fertilizer production never reaches the field because of transport and storage problems. The newspaper *Pravda* suggested, perhaps only half in jest, that Soviet farmers sow their crops along the railroad tracks because so much fertilizer is lost on the way from the factory to the farm. One-third of all fertilizer applied is not used by the plant but instead runs off into the groundwater. Though information is scant, comparable conditions likely apply in much of Eastern Europe. In Czechoslovakia, approximately 40 percent of fertilizers applied are not utilized.³⁴

Similar problems plague pesticide use. According to Alexei Yablokov, Deputy Chair of the Supreme Soviet's environmental committee and a leading environmentalist, nearly one-third of all pesticides produced for domestic consumption in the Soviet Union are lost on their way to the fields. The Soviet statistical agency (Goskomstat) reports that soils have been significantly contaminated by pesticides in Azerbaijan, Armenia, Kirghizia, Moldavia, Tajikistan, and Uzbekistan.³⁵

Though use of DDT was banned in 1972 in the Soviet Union, many reports suggest that large tracts of land continue to be contaminated by the pesticide. According to the Soviet environment agency (Goskompriroda), more than 10,000 hectares of land still contain con-

"Pravda suggested that farmers sow their crops along railroad tracks because so much fertilizer is lost from the factory to the farm."

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centrations of DDT that exceed regulations. In 1988, concentrations of DDT ranged from 13 to 19 times permissible norms in northern Kazakhstan, leading some to suggest that the banned pesticide was still in use. In Novosibirsk Oblast in Siberia, soil samples contain DDT concentrations as much as 200 times the permissible norm. The Soviets are getting rid of their excess stocks by selling them abroad, proving that they are not above "toxic terrorism" despite frequent broadsides against the West for this practice in the past.⁶

Pesticide abuse is endangering both the food consumer and the food producer. According to Yablokov, 30 percent of foods in 1987 contained pesticides in concentrations dangerous to human health. In some areas, half of the food supply was contaminated. The poisoning of agricultural workers poses an added health problem. According to a Communist Party publication, pesticide poisonings in the Soviet Union kill 14,000 people annually and cause an additional 700,000 illnesses.⁷

Forests are unhealthy across much of Eastern Europe and the Soviet Union, a reflection of both poor forest management practices and air pollution and acid rain-related forest damage. While total tree cover is increasing in the Soviet Union, coniferous forests in the European part of the country, which are easily accessible and thereby less costly to harvest, have been depleted. Farther afield, the cedar forests in the Primorskiy and Khabarovsk regions of the Soviet Far East have been reduced by 851,000 hectares, or 22 percent, over the last 20 years because of intensive harvesting. Inappropriate clear-cutting appears to be widespread—90 percent of the timber supply is felled this way.⁸

Transport losses are contributing to deforestation. Up to 25 percent of harvested logs in the USSR are shipped to their destinations by floating down rivers. Because every 20th log sinks, the bottoms of the majority of rivers in the European North, Siberia, and the Far East are covered with wood. The decay process kills other aquatic life. Much wood is also lost in the production process: three to four times more wood is used to produce a unit of finished lumber as in Western countries.⁹

Air pollution-related forest damage in Eastern Europe is among the worst in the world. Woodlands in the brown coal belt of southeastern Germany, southern Poland, and northern Czechoslovakia are dying or

dead. Vast expanses of mountaintops are filled with skeleton-like trees. A count by the United Nations Economic Commission for Europe (ECE) in 1989 found 82 percent of Poland's forests showing some signs of damage, 78 percent of Bulgaria's, 73 percent of Czechoslovakia's, 57 percent of East Germany's, and 36 percent of Hungary's.⁴⁰

According to the Soviet national environmental report, forest damage from industrial air emissions is becoming increasingly severe. Extensive regions near several industrial cities have been affected over the last 20 years. The report implicates sulfur dioxide, nitrogen oxides, hydrogen fluoride, and ammonia emissions in the damage. The problem previously had not been acknowledged, and detailed data have yet to be released. But a photo of the Noril'sk region provides some chilling evidence—vast tracts of dead stumps.⁴¹

Attesting to the extent of overall biological impoverishment is the region's diminishing diversity of life: In the Soviet Union, every tenth bird species, every fifth plant and mammal species, and every fourth amphibian and reptile species is endangered. Fifty-three animal species and 40 plant species have become extinct in Hungary over the last century. The Bulgarian Academy of Sciences has declared 150 animal and 763 plant species endangered or rare. This situation may be partly caused by the encroachment of development on the region's plentiful nature reserves.⁴²

The Green Movement

The magnitude of the environmental problems in Eastern Europe and the Soviet Union has produced a broad-based green movement. (See Table 3.) In the space of a few years, environmental activism has come up from underground, forming an integral part of the new political landscape. The successes this young movement can claim are nothing short of remarkable given the obstacles placed in its way: Until recently, independent non-governmental organizing was strictly illegal throughout the region, and environmental data and information were tightly guarded state secrets. Nonetheless, many challenges lie ahead as the movement adapts to rapidly changing political circumstances.

Table 3: The Environmental Movement at a Glance

Country	Description
Bulgaria	Ecoglasnost, which played role in unseating Prime Minister Zhivkov, now active as both environmental group and political party. Another Green Party, and at least 18 other groups.
Czechoslovakia	Official environmental groups from old era, such as Brontosaurus and Czech and Slovak unions of nature protectors, now independent and being joined by many small groups. The Green Circle is umbrella organization for three major groups and 30 smaller ones. Also a national Green Party.
Eastern Germany	The network ARK, which developed before the revolution under auspices of the Lutheran Church, merged with other groups in 1990 to form the Green League. Green Party established in late 1989. With political union, environmental movements and Green parties merging.
Hungary	In Budapest, environmental movement emerged out of battle against the Danube Dam. Environmental research institute called ISTER established, along with the Independent Ecological Center serving as a resource group for many local groups. Several small Green parties.
Poland	Polish Ecological Club grew out of Solidarity in early eighties. Several Green parties, and more than 40 groups, including the Green Federation and the Franciscan Ecological Movement.
Romania	MER (Ecological Movement of Romania), which operates as both environmental group and Green Party, has taken on leading role. Several small Green parties outside of MER. By one estimate, 112 local groups with some 100,000 members.
USSR	Four umbrella organizations—the Social Ecological Union, the Ecological Union, Ecology and Peace, and the Green Movement—attempts to link numerous local groups into national movement. Viable Green parties in Latvia, Lithuania, Estonia, Moldavia, Byelorussia and the Ukraine.

Source: Worldwatch Institute, based on various sources.

Though Soviet environmentalists only recently have been allowed to play an active and open political role, the roots of their movement run deep. As many ecologists there like to point out, the Soviet Union made some early contributions to environmental thought in the pre-Communist era through the writings of environmental philosophers such as V.I. Vernadsky. In the late 19th century, Vernadsky developed a concept of the world being divided into the biosphere and the "noosphere"—that part of the natural world under the influence of human activity. At an early date, he warned that, without care, humanity's activities would threaten the natural world. Soviet environmentalists still see Vernadsky's concept of the noosphere as providing an essential theoretical underpinning to their movement.⁶³

Though conservationists were respected in the early years of Communist rule, they came under attack in the thirties by Stalinists who felt that the natural world was to be exploited. In the end, the leading lights of the movement were quieted. Some were sent to Siberian workcamps, and a few were executed.⁶⁴

In the sixties, a student nature protection movement developed at Moscow State University that fought for the protection of nature preserves and biodiversity. Some of its members risked their lives fighting poachers at the nature reserves. The movement was tolerated so long as it stuck to nature protection; confronting industrial pollution was considered to be subversive. During the same period, a movement of writers, scientists, and other intellectuals launched a crusade to save Lake Baikal. A variation on this same group coalesced in the early eighties to stop a grandiose plan that would have reversed the direction of Siberian rivers to supply water to arid Soviet Central Asia. In 1986, the group achieved a major victory when the new General Secretary, Mikhail Gorbachev, mothballed the river diversion scheme.⁶⁵

These early efforts revolved around a small, elite group that was able to exert influence through back channels to those in power. In the words of Russian environmentalist Natalya Yourina: "In the sixties, only individuals protested. A movement didn't exist." This changed when the Chernobyl disaster in April 1986 combined with *glasnost* to give rise to a widespread movement encompassing diverse segments of society. Across the vast nation, people began to protest in a fashion never before

witnessed in the Soviet Union. Haltingly at first, and with greater confidence as they stretched the limits of official tolerance, thousands and sometimes tens of thousands turned out for mass demonstrations to protest nuclear power plants, air and water pollution, beach closings, and all manner of environmental degradation.³⁰

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Though no reliable count exists, hundreds and possibly thousands of environmental groups have recently formed. Notes Eric Green, until recently with the American Committee on U.S.-Soviet Relations: "Green activism is in the vanguard of democratization throughout the USSR." Though all groups share some commitment to the environment, the similarity ends there. Given the tremendous variations in nationality and conditions of life throughout the Soviet republics, environmentalism takes on a variety of hues in different regions of the country.³¹

In the republics, most of which are struggling for some measure of sovereignty if not complete independence from Moscow, environmentalism tends to take on highly political overtones. Environmental protests in the early days of *glasnost* in the Baltic republics quickly turned into independence movements, a phenomenon later repeated elsewhere in the country. Currently, many of these "nationalist environmentalists" are preoccupied with independence politics. If and when the republics do become independent, they will have the opportunity to use their new-found autonomy to improve environmental conditions.³²

The environmental movement in the Russian Republic is also influenced by nationalist overtones, although of a slightly different ilk. Russians, partially in response to nationalist movements in the other republics, are passionately setting out to rediscover what is unique about the Russian culture and heritage. This has spawned movements for the preservation of churches and historical monuments as well as for the preservation of Russian countryside and wilderness. Though Russian nationalism is a powerful pro-environment force, it is not without liabilities. In its most extreme form, Russian nationalism can be xenophobic and anti-Semitic.³³

Though most environmental groups in the Soviet Union are focused around local issues, efforts are being made to coordinate their work at the national level. The Social Ecological Union is an umbrella group for

more than 150 nongovernmental organizations (NGOs) in 260 cities and towns. Other coordinating bodies include the Association for the Support of Ecological Initiatives, the Ecological Union, Ecology and Peace, and the Green Movement. The groups vary in their levels of cooperation with the government, with some intentionally taking a confrontational stance while others try to work from within the system. For now, they are overwhelmingly amateur operations, working out of committed people's apartments on shoestring budgets.⁷⁰

In Eastern Europe, environmental activities were until recently frequent targets of governmental repression. Pavel Krivka, a 25-year-old Czech scientist from Jičín, was sentenced to three years in prison for writing a letter about the poor environmental conditions to a friend in West Germany and for writing an ecological-political parody of a traditional Czech Christmas mass. Reports sent to the Worldwatch Institute in the eighties about the situation in Czechoslovakia were clandestinely sent out of the country in the diplomatic pouch of a Western embassy in Prague. In November 1987, the secret police raided an environmental library set up in East Berlin under the protection of the Lutheran Church and confiscated printed material and duplicating equipment.⁷¹

Under the former governments, official nature protection clubs existed that mainly focused on the politically "safe" issues of wildlife conservation and nature reserves. Some of these official clubs were able to test the limits of official tolerance and branch into other areas such as industrial pollution. The report on Bratislava produced by the Slovak Union of Nature and Landscape Protectors, for example, represented a dramatic break with the club's politically restrained past. Addressing issues other than nature protection was dangerous, however: criminal proceedings were started against the report's lead author and the Slovak Communist Party condemned the report as subversive.⁷²

Some dissident groups also viewed environmental issues as part of their agenda. For example, the Czechoslovakian Charter 77 movement clandestinely published a report in 1983, produced by members of the ecological section of the Czechoslovakian Academy of Sciences, detailing the scope of the country's environmental catastrophe and its impact on human health. The study was smuggled to Western newspapers, and made its way back into the country via radio broadcasts.⁷³

"Pavel Krivka was sentenced to three years in prison for writing a letter about the poor environmental conditions to a friend in West Germany."

In September 1980, during the liberalization that accompanied Solidarity's rise, the Polish Ecological Club was founded in Krakow, Poland. It was the first fully independent environmental group established in Eastern Europe. After the revolutions, officially-sponsored nature protection groups became independent, underground dissident groups surfaced, and many new groups formed. Independent environmental movements now exist in every East European country, although the Romanian movement still reports some repression. These groups are struggling with organizational questions: What kind of relationship should they have with government environment ministries? What should their platform be? How should they fund themselves? Is there room for a variety of groups with different approaches?⁷⁴

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One of the most fundamental questions faced by each movement is whether it should pursue its aims through Green parties or through advocacy groups outside the political structure. This question rings familiar to Western Greens, who have faced a similar quandary for many years. It appears the question will be answered in the same way in the East as it has been in the West: both have a useful and distinct role to play.⁷⁵

Each East European country now has a Green party, as do the Soviet republics of Latvia, Lithuania, Estonia, Moldavia, Byelorussia, and the Ukraine. In Bulgaria, Ecoglasnost, the movement that helped unseat Zhivkov, and the Green Party together hold 32 seats in parliament. The Green Party holds seven seats in the Estonian parliament, six seats each in the Latvian and Slovakian, and nine in the Lithuanian. In Romania, the Green Party and the Green Movement hold 23 seats in parliament between them.⁷⁶

Although the Green Parties did not do as well as initially expected in the elections of spring 1990, their loss is in some sense a measure of the movement's success: virtually all the competing political parties had strong environmental platforms. Environmentalists are skeptical, however, that those in power will adhere to them. Including a clause on environmental degradation in the platform was for many parties simply another way of criticizing the old regime. The fledgling environmental movement faces the task of pressuring the new governments to abide by their campaign promises.⁷⁷

The Official Response

- 34** Though their environments do not show it, both the Soviet Union and the East European countries have stringent environmental regulations on the books. Air and water quality standards actually tend to be stricter than those of Western nations, because they are based on a scientific determination of the level necessary to avoid health problems. Unlike in the West, the standards do not have to survive the vicissitudes of the political process.

Unfortunately, enforcement of these laws has been poor. Because most industry continues to be state-owned, the regulator and the regulated are one and the same, posing a formidable conflict of interest. Moreover, the ministries charged with industry, agriculture, and forestry have considerably more clout than the new agencies charged with environmental enforcement. The production ministries have often succeeded in getting themselves exempted from fines. The penalties that are levied have barely made a dent: the offending industry, being state-owned and monopolistic, simply passes the bill on to the central government. The production target—the overriding goal for which a plant manager is rewarded or penalized—is unaffected. In the Soviet Union, there is actually an incentive to violate the norms, because enterprises' future budgets are based on past expenses, including natural resources used and fines paid. The higher the total, the greater the future allocations.⁷⁶

Efforts to reform environmental policy making depend on the broader political transformations now underway. The strength of Soviet environmental institutions, for example, will be influenced by President Gorbachev's plan to transfer power away from the Communist Party towards the executive branch and the legislature (Congress of Peoples' Deputies and Supreme Soviet). Though for years the Supreme Soviet and the ministries rubber-stamped the decisions of the Communist Party and the Politburo, this is rapidly changing. Indeed, the parliamentary bodies are now largely democratically elected, and their non-Communist members forming something of a political opposition.⁷⁷

Goskompriroda, the Soviet environment agency, was created in early

1988. It was charged with coordinating work previously spread out among many ministries, and was given broad enforcement powers over other agencies. Unfortunately, Goskompriroda has been beset by problems. Its first head, Fyodor Morgun, left after 15 months, claiming he was frustrated by his lack of power to confront the production ministries. By some accounts, he was too inexperienced for the job.⁸⁰

The hopes of environmentalists have been raised by the appointment of Nikolai Vorontsov to take his place. Vorontsov is a highly-regarded biologist and the first non-Communist Party member ever to hold a ministerial-level post in the Soviet Union. Vorontsov admits that his task is a formidable one. The agency has a staff of only 450, compared with 5,000 at the U.S. Environmental Protection Agency (EPA) in Washington, D.C., only two computers, and a budget of 20 million rubles [\$35 million], compared with EPA's budget of \$5.5 billion. When asked by a journalist what compelled him to take the job, which was rejected by eight other prominent people, he replied: "I agreed because I was ashamed for our great country."⁸¹

The Congress of Peoples' Deputies and the Supreme Soviet are playing an active role in the reform of environmental policy making. According to one analysis, as many as 300 of the deputies (13 percent) could be classified as Greens. During the first meeting of the USSR Congress, delegate after delegate took the floor to decry the appalling environmental conditions in his or her district. Eighty percent of the speeches reportedly contained references to the environment. This created public momentum for aggressive governmental cleanup efforts. The Supreme Soviet now has an Ecology Committee with many prominent and highly respected scientists, writers, and environmental activists as members.⁸²

Together, Goskompriroda and the Supreme Soviet are in the process of overhauling the country's environmental legislation. The agency sent a bill to the Supreme Soviet in the fall of 1989 calling for, in Vorontsov's words, "the primacy of ecology over economics, of the interests of citizens over the interests of departments." It also called for environmental impact assessments, public participation in decision making, and the establishment of fees for the use of natural resources.⁸³

The Supreme Soviet responded with a resolution of its own, which urged that urban air, drinking water, and food meet health standards by 1995. It also called for environmental impact assessments and economic incentives for pollution reduction. In addition, it advocated a halt to nuclear weapons testing at Semipalatinsk in Kazakhstan, a re-examination of nuclear power plant construction plans, and investments in alternative energy. Though the resolution is a promising step forward, translating such a comprehensive program into law will be difficult.⁵⁴

Gorbachev's proposed economic reforms also have critical implications for the environment. To date, fines have not had much effect. However, reforms requiring industries to show a profit and to be self-financing would help make penalties pinch. In addition, reducing mammoth energy and water subsidies would encourage conservation. Giving local and regional authorities more power to close down enterprises or take enforcement actions would also be environmentally beneficial. Many of these key elements of *perestroika* remain only partially implemented, though they will be accelerated under the recently adopted plan for a gradual transition to a Western-style market economy.⁵⁵

As discussion continues on these long-term measures, the public is increasingly demanding immediate results. The easiest response for the government has been to simply close plants. In 1989, 240 factories in the Soviet Union were shut down for environmental reasons. As a result, 1990 output will be reduced by 5.2 million tons of fertilizer, 951,000 tons of soda, 400,000 tons of cellulose, 387,000 tons of methanol, 500,000 tons of polymers, and over 250,000 tons of synthetic rubber, among other goods.⁵⁶

Such losses could lead to a backlash. For one thing, hundreds of thousands of jobs are threatened. Also, shortages of essential goods are being exacerbated, as the Soviet Union does not have excess production capacity and lacks the hard currency to import these goods. Many plants producing essential medicines and scarce paper have been closed. For instance, when the heavily polluting Sloka pulp and paper mill in Jurmala, Latvia, was shut down, the republic's newspapers ceased to appear for lack of newsprint.⁵⁷

Across the region, perhaps no issue has been as contentious as nuclear power. Though governments continue to voice commitment to their

"In 1989, 240 factories in the Soviet Union were shut down for environmental reasons."

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nuclear programs, the disclosures about Chernobyl and new information about brushes with serious accidents in Eastern Europe have undermined public faith in these programs. It has been revealed, for example, that dangerous nuclear accidents at the Greifswald plant in eastern Germany and the Bohunice plant in Czechoslovakia took place but were kept secret. Western audits have confirmed that most of the plants in Eastern Europe would not meet Western safety standards, and bringing them up to standards would be economically infeasible. Many East Europeans thus believe they are faced with an unenviable choice between deadly brown coal power plants and risky nuclear ones.*

In the face of public concern, the future of the region's nuclear programs is seriously in doubt. Plans for 30 nuclear power plants in the Soviet Union have been abandoned or indefinitely suspended since the Chernobyl accident. Of the 26 reactors listed as planned for Eastern Europe in 1990, only six are under construction. In the past year, four operating reactors were shut down, and construction was halted or plans were cancelled for 14 reactors. In addition, Germany and Czechoslovakia announced plans to close three plants ahead of their scheduled decommissioning dates.**

The new governments in Eastern Europe are beginning to formulate environmental strategies. Though many of the declarations of environment ministries and newly formed parliaments are impressive, it remains to be seen how they will fare against entrenched economic interests and the public's longing for rapid improvements in material well-being.

Eastern Germany is a special case, as it is now part of a unified Germany. New factories, power plants, or engines must meet standards of the former West Germany; existing enterprises have until the end of the decade to either conform or close down. According to one estimate, some 65,000 formerly East German firms may be forced to close for environmental reasons. Many of the most polluting plants are also economically uncompetitive—heavy industries using obsolete equipment.**

For the other countries of the region, however, there is no "rich uncle." Still, Poland and Czechoslovakia are launching ambitious cleanup pro-

grams. In Poland, new Minister of the Environment Bronislaw Kaminski has already published a "hit list" of 80 major industrial polluters. The ministry and local authorities will develop a timetable for bringing these enterprises into compliance with environmental regulations. Observes Kaminski: "It is most likely that in the case of the worst polluters a shut-down will prove to be the only acceptable schedule." Additionally, loopholes for polluters will be closed, existing environmental legislation overhauled, and environmental auditing required. Kaminski has also outlined an extensive program of environmental protection investments, including 3,000 new wastewater treatment plants, to be completed by 1995.⁴¹

Over the long term, Kaminski expects economic reforms to yield environmental benefits as energy and materials are used more efficiently. Poland has already started a program of "shock treatment" economic reforms intended to lead quickly to a market economy. Since January 1990, energy prices have increased by 400 to 600 percent, reducing car use by 10 to 15 percent. The "shock treatment" has also led to mass unemployment and slashed government services, so it remains to be seen whether Poland's approach will prove viable.⁴²

In Czechoslovakia, President Vaclav Havel made it clear from the beginning of his term that the environment would be a priority. In his address upon becoming Provisional President on New Year's Day 1990, Havel stated: "We have laid waste to our soil and the rivers and the forests that our forefathers bequeathed to us, and we have the worst environment in the whole of Europe today." He proceeded to appoint prominent environmentalists to lead environmental agencies at the Czech and Slovak republic and federal levels.⁴³

In the space of just a few months, both the Czech Republic and the Federal Ministry have produced book-length environmental reports filled with detailed, previously secret data. The Slovakian nongovernmental movement is currently producing a report of its own.⁴⁴ As interesting as the environmental data in the Czech report is the political commentary:

The group which ruled our country had one main goal: to remain in power. Three main tools were used for its attainment. One was lying. In the sphere of environment this meant keeping secret the grave environmental situation. Secondly, collective responsibility. In reality, this meant irresponsibility. You could never find one person responsible for the putting into practice of important actions, and there was no one to blame when they weren't put into practice. ... Thirdly, Branch Management. Each sphere of human activity had its own ministry, and the ministry built a thick wall around itself. ... Such a system is a logical fruit of a system of power emanating from one all-powerful center, which must take care that all decisions of a wider reach are taken by that center alone. Such a system did not and could not work, especially in the sphere of the environment, which cuts across artificial borders.⁶

In addition, Minister of the Environment Josef Vavroušek spelled out a policy designed to make environmental protection a central element in the country's shift to a market economy. Under his plan, financial incentives—such as emissions taxes or refundable deposits—would play a large role. Vavroušek says the environmental plan must succeed, even "at the cost of delaying the growth of material consumption." He will shortly send to parliament draft laws calling for environmental impact assessment, tightened waste management, and air pollution regulations. Though his proposals are good, environmentalists fear that they will be opposed by other ministries and interests. Indeed, an economic plan presented in September 1990 did not incorporate Vavroušek's proposals.⁷

Hungary, Bulgaria, and Romania are moving somewhat more slowly. Hungary still has a relatively ineffective environment ministry that, until September 1990, was combined with a public-works-style water development agency. It is too soon to tell whether the separation of the agencies will enable the environment ministry to pursue its mandate more effectively. Ominously, the administration of construction was combined with the environment ministry. Says environmentalist Janos Vargha: "This could be a new fox in the henhouse."⁸

The Prime Minister of Bulgaria presented a \$1.2-billion plan in March 1990 to combat industrial pollution, but skeptics question whether the

government will be able to come up with this sum. In Romania, environmentalists did not waste much time taking advantage of the revolution: a new environment ministry was formed on December 28, 1989, just days after Ceausescu loyalists stopped shooting on the streets of Bucharest. Unfortunately, continuing political instability in Romania does not bode well for the environment receiving needed attention soon.³⁶

A Policy Agenda

Given the degraded environment's toll on human health and biological productivity, decontaminating Eastern Europe and the Soviet Union is best seen as a precondition to economic development, not an obstacle. Many of the most polluting plants would be closed for purely economic reasons during a transformation from an industrial-based economy to a more service- and consumer goods-oriented one. As new investment occurs, it can be marshalled to help meet environmental needs.

But cleaning up the region will cause substantial short-term economic and social dislocations. According to the German Institute of Ecological Economic Research, bringing eastern Germany's environment up to the new Germany's standards will be a 10-year, \$249- to \$308-billion effort. Poland's environment minister estimates that improving conditions in his country will cost \$20 billion over the next 10 to 20 years. Czechoslovakians believe they will need to spend at least \$23.7 billion on pollution control in the next 15 years. According to one estimate, the Soviet Union must spend 100 billion rubles (\$175 billion) immediately and 10 billion rubles annually just to reduce air pollution to the accepted limits. In addition, many jobs are threatened: the closing of just one chemical works at the notoriously polluted Bitterfeld complex in eastern Germany put 10,000 people out of work. Thus, the challenge is to design cleanup programs that offer maximum long-term gain for minimum short-term cost.³⁷

Eastern Europe and the Soviet Union have a unique opportunity to cull from 20 years of Western experience in addressing environmental problems. They could "leapfrog" the West in both policies and technologies. By implementing the strategies that have proved most effective, Eastern

**"The challenge is to design cleanup programs
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Europe and the Soviet Union could realize the greatest possible return on environmental investments.

One such strategy is to encourage energy efficiency. This is particularly important in light of pent-up demand for consumer goods that, as it is met, could lead to large increases in energy consumption. Energy efficiency offers the advantage of being both economically and environmentally beneficial. The less energy burned, the less pollution produced. In addition, the savings from forgoing construction of new power plants can more than offset the costs of installing pollution control technologies such as scrubbers on existing ones. In the United States, for example, the American Council for an Energy Efficient Economy has estimated that sulfur dioxide emissions from power plants in the Midwest could be cut in half at a net savings of \$4- to \$8 billion if pollution control and energy efficiency were pursued simultaneously.¹⁰⁰

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As Eastern Europe and the Soviet Union move toward a greater reliance on markets, energy efficiency will improve. Higher energy prices and the profit motive will spur conservation. Energy-hungry heavy industries are likely to prove uncompetitive under such a shift. According to a case study conducted by Alexei Makarov and Igor Bashmakov of the Soviet Energy Research Institute, such economic shifts, known as structural reform, could reduce Soviet energy demand by one-sixth of projected levels over the next two decades. In Poland, a case study conducted by Stanislaw Sitnicki and colleagues found that reform could reduce projected energy demand by nearly half over 40 years.¹⁰¹

Aggressive efforts to replace outmoded equipment with more efficient technologies would yield still greater returns. According to the case studies cited above, over the next 15 years the Soviet Union could reduce energy consumption by an amount equal to a quarter of current levels and Poland by 40 percent of current levels and save money: the investment in efficient technologies would be less than the cost of building new power plants.¹⁰²

Unfortunately, golden opportunities are being lost. For example, the U.S. Overseas Private Investment Corporation (OPIC) recently under-

wrote General Electric's \$150-million project to refurbish 13 Hungarian incandescent lightbulb factories. If this money had been spent on compact-fluorescent lightbulb factories instead, it would have saved the Hungarian government \$10 billion in the construction of new, polluting, coal-fired power plants. For General Electric this was undoubtedly a sound business decision, but OPIC or the Hungarian government could have encouraged investment in the compact-fluorescent factories instead.¹⁰³

Transportation policy also presents leapfrogging opportunities. Two decades of attempts to improve urban air quality in the West have made it clear that combatting automotive pollution by technological means, such as catalytic converters, is not sufficient. Increasingly large car fleets have wiped out any gains. In car-dependent North America, many urban dwellers regret that public transportation systems were allowed to atrophy.¹⁰⁴

In Eastern Europe and the Soviet Union, by contrast, public transportation systems are extensive and widely used. Hungary, for example, relies on public transport for 58 percent of urban passenger trips and automobiles for 11 percent, while in the United States only 3 percent of urban trips are made by public transportation and 82 percent by car. (See Table 4.) There is a danger that public transportation in Eastern Europe and the Soviet Union will go the way it did in the United States, as consumers fulfill long-standing dreams of auto ownership. Careful public policy decisions could prevent this by treating automobiles as one component, rather than the dominant player, in a diversified transportation scheme.¹⁰⁵

Without measures to encourage recycling and waste reduction, production of household garbage in the region is likely to skyrocket as Western packaging practices take hold. The Russian Republic now produces about 186 kilograms of household and commercial waste per capita annually; the former West Germany produced 473 kilograms per person. One East Berlin sanitation worker estimated that garbage production went up 20 percent after the fall of the Berlin wall. In the industrial arena, Western experience shows that reducing the amount of waste generated in the production process is cleaner and often cheaper than trying to trap emissions or effluent at the end of a pipe.¹⁰⁶

Table 4: Share of Urban Passenger Trips by Transportation Mode, Selected Countries¹

Country	Auto	Pedestrian and Bicyclist	Public Transport
		(percent)	
Soviet Union ²	12	—	88
Poland ²	15	—	85
Hungary	11	31	58
Czechoslovakia	13	35	52
East Germany	24	48	27
United Kingdom	45	33	19
Sweden	36	49	11
France	47	35	11
West Germany	48	40	11
Netherlands	45	48	5
United States	82	10	3

¹Data range from 1978 to 1987, depending on the most recent year for which information is available, and reflect modal split for all trip purposes. Due to variations in measurement, sum of shares for any one country may not equal 100 percent.

²Data refer only to automobiles and public transport, and thus exclude pedestrian and bicycle trips.

Source: John Pucher, "Capitalism, Socialism, and Urban Transportation," *Journal of the American Planning Association*, Summer 1990.

It would be unfortunate if Eastern Europe and the Soviet Union followed the West down the path toward wanton materialism. Many of the East European intellectuals who led the recent revolutions are wary of consumerism. In his essay "The Power of the Powerless," Czechoslovakian President Vaclav Havel writes of "the omnipresent dictatorship of consumption, production, advertising, commerce, and consumer culture" in the West. But the majority of the region's people, who often lack even basic goods such as soap, are understandably unenthused by the notion of restraining consumption. Finding the proper balance between sufficiency and excess will be as difficult for Eastern Europe and the Soviet Union as it has been for the West.¹⁰⁷

The move toward market-based pricing offers environmental bonuses. As energy, water, and other industrial and agricultural resources are priced closer to their market value, it will create an incentive to conserve. However, markets are by no means a panacea; they fail miserably at taking environmental costs into account. Eastern Europe and the Soviet Union might look seriously at measures now under consideration in the West to help correct this. For example, all of the Western countries are now considering expanding their use of "eco-taxes," which penalize activities that pollute or degrade the environment. The challenge is to set the taxes at high enough levels to spur the desired response.¹⁰⁸

International cooperation will be critical to the region's environmental restoration. At the nongovernmental level, environmentalists in both the Soviet Union and Eastern Europe are increasingly cultivating ties with Western environmental groups and Green parties. For example, the Green parties of countries bordering the Baltic Sea have established the Balto-Scandian Information Center to push governments to respect previous commitments to reduce their discharges into the sea. A "Common House of Europe" project among East and West European NGOs is pushing for the conversion of former border areas into parks. In a protest at the Temelin nuclear plant in southern Czechoslovakia, Austrian and Czech Greenpeace activists placed a banner across the plant's cooling towers, a move that would have been unthinkable before the revolution. The Soviet-based Social Ecological Union and the U.S.-based Natural Resources Defense Council have joined forces to fight environmentally harmful joint ventures.¹⁰⁹

In addition to the practical results of NGO cooperation, it provides badly-needed support to indigenous environmental groups. By working with Western counterparts, East Europeans and Soviets learn about and emulate the important role of public interest groups in forming environmental policy in the West. The public's right to participate is by no means taken for granted by bureaucrats in the region; entrenched attitudes die hard.

At the governmental level, environmental aid programs for Eastern Europe have blossomed over the past year. The World Bank made an \$18-million loan to Poland to help improve environmental manage-

ment practices, and a loan for Hungary is in preparation. Czechoslovakia and Bulgaria recently became World Bank members, paving the way for environmental loans to these countries. An arm of the Nordic Investment Bank, the Nordic Environmental Financing Corporation, is expected to approve its first environmental investments in Eastern Europe soon—\$45 million to help establish joint venture projects to reduce air and water pollution and improve energy efficiency.¹⁰

The new European Bank for Reconstruction and Development (EBRD) may be another important contributor. An international NGO campaign succeeded in placing an environmental mandate in the bank's charter. The NGOs are now pushing for measures such as an environmental office, adequate staffing, a clear commitment to the environment in the new bank's lending program, and public participation in project review. It remains to be seen if the environmental mandate will be honored when the bank begins lending in March 1991.¹¹

The European Community has so far committed \$65 million for environmental programs in Poland and Hungary, and has plans to extend its lending program to Bulgaria, Czechoslovakia, and possibly Romania. The East European countries will be included in the new European Environment Agency; a primary task of the new agency will be the collection of uniform, continent-wide data. A group called the Pentagonale—comprised of Austria, Czechoslovakia, Hungary, and Italy—is working to foster regional cooperation on environmental management and data systems, waste management, nuclear safety, and international parks. In another multilateral effort, a regional center in Budapest initiated by the United States and funded by the European Community, Austria, Canada, Finland, Hungary, the Netherlands, and Norway, began operations on September 6, 1990. Among its many roles, the center will mediate between advocacy groups and the governments of the region, according to Peter Hardi, the center's executive director.¹²

Bilateral programs are also flourishing. The United States has provided Hungary and Poland with \$40 million in environmental aid, and will soon provide funds to Bulgaria, Czechoslovakia, and Romania. Among the likely new U.S. initiatives is financial support for a center in

Warsaw, Poland, to promote energy efficiency. In addition to its commitment to clean up the eastern part of its new nation, Germany has launched a \$120 million aid program for Poland, which also expects to receive \$60 million from Sweden, \$70 million from Denmark, and \$35 million from Finland.¹¹³

The reluctance of the United States and, until recently, Western Europe, to provide financial help to the Soviet Union means that little, if any, Western governmental money has yet flowed for environmental assistance. However, the Soviet Union has bilateral agreements with 10 countries for scientific and technical cooperation. According to the Soviet national environmental report: "The cooperation with the USA occupies a special position both with regard to the volume of joint enterprises and efforts, the broad variety of topics, and results achieved to date."¹¹⁴

More remunerative forms of cooperation are in the works: The European Community and the Soviet Union are working on a joint nuclear safety project and European Community President Jacques Delors has singled out the environment as an area for future cooperation. In addition, the Norwegian, Finnish, and Swedish governments are expected to help finance the installation of pollution controls on two Soviet nickel smelters that are exporting acid emissions to Scandinavia.¹¹⁵

The aid offered so far will help, but the funds set aside for the environment are very small compared with the total packages of economic assistance. Thus, it is important that environmental considerations form an integral component of all aid and trade deliberations. Lending for isolated environmental schemes while giving larger amounts of funding for damaging industrial, transport, or energy projects is equivalent to taking a small step forward and then a giant step back.

The West has an obvious role in preventing "ecological colonialism"—the export of environmentally hazardous forms of resource extraction or industry to countries with lax regulations and a thirst for hard currency. For example, an enormous petrochemical complex being built in the Tyumen region of Siberia by Japanese, American, German, and Italian firms is raising the ire of Soviet environmentalists. At the very

"The funds set aside for the environment are very small compared with the total packages of economic assistance."

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least, corporations can insure that their new plants meet Western environmental standards. The European Community is planning to establish an environmental code of conduct for investment in Eastern Europe. Occidental Petroleum has taken the promising step of announcing that all its new overseas facilities must meet U.S. or local environmental standards, whichever are stricter.¹¹⁶

Given the transboundary nature of environmental problems in Eastern Europe and in the western republics of the Soviet Union, international agreements will be critical. Under the auspices of the ECE, two air pollution reduction protocols have been signed and a third is in the early stages of preparation. In addition, member nations of the Commission on Security and Cooperation in Europe have requested the ECE to begin work on a transboundary water pollution treaty.¹¹⁷

Technology transfer will also be a key to restoring the East European and Soviet environments. Environmental aid will help purchase some of the needed technology, but indigenous environmental protection industries need to be established as well. This is most likely to be accomplished through joint ventures and other arrangements with Western firms. The transboundary air pollution treaties provide an example of the need for technology transfer. Though most East European countries and the Soviet Union have signed these agreements, it is unlikely they will all meet the agreed targets—in part because they lack the necessary technology.¹¹⁸

Finally, the West could consider creative means of reducing the debt burdens of East European countries. Poland is saddled with a \$42 billion debt, 64 percent of its annual GNP. Hungary's debt of \$18 billion, is 65 percent of its GNP. Czechoslovakia and Bulgaria also have large outstanding bills, though official numbers are not yet available. Observers agree that such deeply indebted countries will not be able to pay the debts back. Meanwhile, the interest payments are crippling their economies, precluding investments in environmental protection and other critical governmental services.¹¹⁹

Debt-for-environmental-protection swaps are one way out of the morass, although they have proven cumbersome to negotiate.

However, two swaps have been negotiated with Poland, one by the German government and the other by the Washington, D.C.-based World Wildlife Fund (WWF). The government-financed swap will generate \$60 million that will finance half of Germany's environmental aid program for Poland. The WWF swap will generate \$50,000 for a project to help clean up Poland's Vistula River.¹²⁰

The political transformation of Eastern Europe and the Soviet Union offers both opportunities and pitfalls. Though the countries of the region have a unique chance to avoid some of the West's mistakes, powerful forces pull them toward repeating the errors. With persistence and fortitude, this can be avoided. The revolutions of 1989 offer the hope of a brighter future, but this hope will only be realized if the countries of the region move quickly to restore their environments.

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